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| 09/449,679 | 11/24/1999 | KATSUHITO SAKURAI | 35.C14042 | 6571 |

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

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| EXAMINER |
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HANNETT, JAMES M

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| ART UNIT | PAPER NUMBER |
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2612

DATE MAILED: 11/21/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/449,679

Applicant(s)

SAKURAI ET AL.

Examiner

James M Hannett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-23 is/are allowed.
- 6) ☒ Claim(s) 24, 26, 28, 29, 32, 37 and 42-44 is/are rejected.
- 7) ☒ Claim(s) 25, 27, 30, 31, 33-36, and 38-41 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 November 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- 1: Claims 24, 26, 28, 29, 32, 37, and 42- 44 rejected under 35 U.S.C. 102(e) as being anticipated by USPN 6,243,134 Beiley.
- 2: In regards to Claim 24, Beiley teaches on Column 6, Lines 34-65 and Column 7, Lines 1-36 and depicts in Figure 5 a signal read-out method for a solid-state image pickup apparatus which holds, in capacitance means (C2), signal charges generated by a photoelectric conversion unit (PD2) and outputs a signal corresponding to the signal charges held by said capacitance means from amplification means (M13), comprising A first read-out mode in which a signal is output from said amplification means (M13) while holding the signal charges generated by said photoelectric conversion unit in said capacitance means (C2) set at a first capacitance value, and A second read-out made in which, after the first read-out mode, the capacitance value of said capacitance means is charged from the first capacitance value to a second capacitance value (C3), and a signal corresponding to the signal charges held by said capacitance means set at the second capacitance value is output form said capacitance means. Beiley teaches that the image sensor has two distinct read out modes. In one read out mode signal charges are held in capacitor (C2) with the use of (M12) and signal charge is read out of capacitor (C3). For the other read out

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mode both transistors (M11 and M12) are activated and signal charge is transferred from C2 to C3 and is then read out of the image sensor.

3: In regards to Claim 26, Beiley teaches on Column 6, Lines 34-65 and Column 7, Lines 1-36 and depicts in Figure 5 a signal read-out method for a solid-state image pickup apparatus, comprising: a holding read-out mode in which a signal corresponding to signal charges generated by a photoelectric conversion unit (PD2) is output from amplification means (M13) while keeping the signal charges held by capacitance means; This mode is viewed by the examiner as the mode in which signal charge is held in Capacitor (C2) while the charge in capacitor (C3) is being read out. A non-holding read-out mode in which a signal is output from said amplification means (M13) without holding any signal charges in said capacitance means, This mode is viewed by the examiner as the read out mode in which both transistors (M11 and M12) are activated and signal charge is transferred from C2 to C3 and is then read out of the image sensor.

Wherein the holding read-out mode has a first holding read-out mode in which a signal is output from said amplification means (M13) while keeping the signal charges held by said capacitance means set at a first capacitance value (C2), and a second holding read-out mode in which a signal is output from said amplification means (M13) while keeping the signal charges held by said capacitance means whose capacitance value is set at a second capacitance value (C3) different from the first capacitance value (C2), and The non-holding read-out mode has a first non-holding read-out mode in which a signal is output from said amplification means (M13) without holding any signal charges in said capacitance means (C2) set at the first capacitance value, and a second non-holding read-out mode in which a signal is output from said amplification means (M13) without holding any signal charges in said capacitance means whose

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capacitance value is set at the second capacitance value (C3) different from the first capacitance value.

4: In regards to Claim 28, Bailey teaches on Column 6, Lines 34-65 and Column 7, Lines 1-36 and depicts in Figure 5 a signal read-out method for a solid-state image pickup apparatus, comprising: A holding read-out mode in which a signal corresponding to signal charges generated by a photoelectric conversion unit (PD2) is output from amplification means (M13) while keeping the signal charges held by capacitance means (C2); Bailey teaches that the image sensor has two distinct read out modes. In one read out mode signal charges are held in capacitor (C2) with the use of (M12) and signal charge is read out of capacitor (C3). For the other read out mode both transistors (M11 and M12) are activated and signal charge is transferred from C2 to C3 and is then read out of the image sensor. A non-holding read-out mode in which a signal is output from said amplification means (M13) without holding any signal charges in said capacitance means (C2), Wherein the holding read-out mode has a first holding read-out mode in which a signal is output from said amplification means (M13) while keeping the signal charges held by said capacitance means set at a first capacitance value (C2), and a second holding read-out mode in which a signal is output from said amplification means while keeping the signal charges held by said capacitance means whose capacitance value is set at a second capacitance value different from the first capacitance value, and The non-holding read-out mode has a non-holding read-out mode in which a signal is output from said amplification means (M13) without holding any signal charges in said capacitance means set at the second capacitance value (C3).

5: As for Claim 29, Bailey teaches on Column 6, Lines 34-65 and Column 7, Lines 1-36 and depicts in Figure 5 A solid-state image pickup apparatus including a plurality of pixels, each

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pixel comprising: A photoelectric conversion unit (PD2); Holding means for holding a signal from said photoelectric conversion unit (C2 and C3); Read-out means (M14) for reading out the signal held by said holding means (C2 and C3); and Capacitance changing means (M11 and M12) for changing a capacitance value of said holding means.

6: In regards to Claim 32, Column 3, Lines 45-53 a solid-state image pickup apparatus comprising: A photoelectric conversion unit (PD2); and a charge/voltage conversion unit for converting signal charges transferred from said photoelectric conversion unit into a signal voltage; Column 3, Lines 45-53. Wherein said charge/voltage conversion unit comprises a plurality of capacitances (C2 and C3) having different dependences on voltage.

7: As for Claim 37, Bailey teaches on Column 4, Lines 34-65 further comprising reset means (M10) for applying a reset voltage (Vcc) to reset said charge/voltage conversion unit (M10), wherein a charge/voltage conversion efficiency of said charge/voltage conversion unit is controlled by controlling a voltage value of the reset voltage (Vcc).

8: In regards to Claim 42, Bailey teaches on Column 6, Lines 34-65 and Column 7, Lines 1-36 and depicts in Figure 5 a solid-state image pickup apparatus including a plurality of pixels, each pixel comprising: A photoelectric conversion unit (PD2); A charge/voltage conversion unit (M10 and reset voltage generating circuit) for generating a voltage corresponding to a charge amount of the signal charges from said photoelectric conversion unit; Column 3, Lines 45-53. Control means Column 4, Lines 45-65 for controlling to change a charge/voltage conversion efficiency of said charge/voltage conversion unit in accordance with the charge amount of the signal charges; and read-out means (M14) for reading out the voltage generated by said charge/voltage conversion unit to an output line (Output).

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9: As for Claim 43, Bailey teaches on Column 4, Lines 45-65 control means comprising reset means (M10 and reset circuitry) for applying a reset voltage (Vcc) to reset said charge/voltage conversion unit, and the charge/voltage conversion efficiency of said charge/voltage conversion unit is controlled by controlling a voltage value of the reset voltage.

10: In regards to Claim 44, Bailey teaches on Column 6, Lines 34-65 and Column 7, Lines 1-36 and depicts in Figure 5 a solid-state image pickup apparatus including a plurality of pixels, each pixel comprising: A photoelectric conversion unit (PD2); A charge/voltage conversion unit Column 3, Lines 45-53 for generating a voltage corresponding to a charge amount of the signal charges from said photoelectric conversion unit; and Read-out means (M14) for reading out the voltage generated by said charge/voltage conversion unit to an output line (Output), Wherein a charge/voltage conversion efficiency of said charge/voltage conversion unit changes in accordance with the charge amount of the signal charges.

Allowable Subject Matter

11: Claims 25, 27, 30, 31, 33-36, and 38-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12: Claims 1-23 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach the method of reading out image signals from an image sensor by outputting a first signal which is stored in a first capacitance and outputting a second signal that is stored in both a first capacitance and a second capacitance. The prior art teaches the use of two capacitances in a pixel of an image sensor. Bailey does not perform a readout when both

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capacitors are in parallel to each other. Bailey teaches the method of reading out the signal stored in capacitor C3 and then transferring the charges from capacitor C2 to capacitor C3 and then read out. Bailey does not teach the method of activating M12 at the time of a read out so that all the charges on C2 and C3 can be read out in the same read out operation.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 2001/0007471 Bailey teaches the use of an image sensor with first and second capacitors in each pixel; USPN 6,133,862 Dhuse et al teaches a method for reducing the reset noise in a photo-diode; USPN 6,011,251 Dierichx et al teaches the use of an image sensor with a capacitor within the pixel and a method for increasing the dynamic range of the pixels; USPN 6,538,693 Kozuka see Figure 1A; USPN 6,243,134 Bailey see Figure 5; USPN 6,587,146 Guidash teaches the use of an image sensor with a differential amplifier output and a capacitance within each pixel; US 2002/0154231 Decker et al see Figure 4; USPN 5,818,052 Elabd teaches the use of a low light level image sensor; USPN 5,990,471 Watanabe teaches the use of an image sensor with a differential amplifier at the output to the image sensor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M Hannett whose telephone number is 703-305-7880. The examiner can normally be reached on 8:00 am to 5:00 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on 703-305-4929. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Customer Service whose telephone number is 703-308-6789.

James Hannett
Examiner
Art Unit 2612

JMH
October 24, 2003


WENDY R. GARBER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600